Key Sample-6 (Page 1 of 2)

A* SEARCH: S -> G

Expanded	Search Fringe (g+h=f)
S	B(3+6=9), C(7+5=12), J(7+8=15)
B	C(7+5=12), J(5+8=13)
C	J(5+8=13), K(10+3=13), H(8+6=14), G(14+0=14), F(13+4=17) C(13+5=18)
J	E(12+1=13), K(10+3=13), G(14+0=14), H(8+6=14), J(7+8=15) F(13+4=17), C(13+5=18), I(15+6=21)
E	K(10+3=13), G(14+0=14), H(8+6=14), J(7+8=15), F(13+4=17) C(13+5=18), I(15+6=21)
K	G(14+0=14), H(8+6=14), K(11+3=14), J(7+8=15), F(13+4=17) C(13+5=18), I(15+6=21)
G	[]
	Solution path: S -> B -> J -> E -> G

Key Sample-6 (Page 2 of 2)

Question 2: Alpha-Beta Minimax

A=11

B=11 **C=6**

D=14 **E=11** **F=6**

H=14 **I=5** **J=8** **K=11** **L=2** **M=6** **N=10** **O=7**

Pruned Nodes: G, N, O

Question 3: Decision Tree

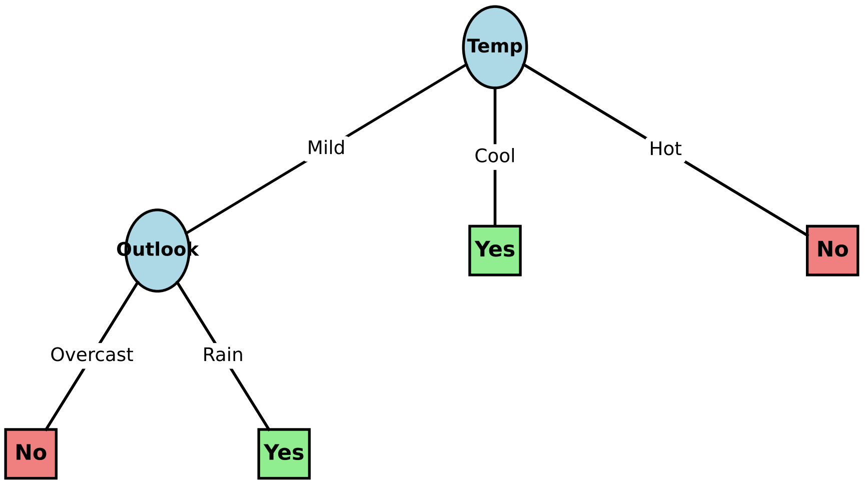
Information Gain Computations:

Node: Temp

✓ Temp: 0.6101
Outlook: 0.2044
Wind: 0.0032

Node: Outlook

✓ Outlook: 0.9183
Wind: 0.2516



Question 4: First-Order Logic Translation

Predicates: Gym(x), Member(x), BelongsTo(x, x), Active(x)

a. English to First-Order Logic:

1. Every gym has members.

   Solution: ∀x (Gym(x) ⇒ ∃y (Member(y) ∧ BelongsTo(y, x)))

2. Active members belong to gyms that have other active members.

   Solution: ∀x (Member(x) ∧ Active(x) ⇒ ∃y (Gym(y) ∧ BelongsTo(x, y) ∧ ∃z (Member(z) ∧ Active(z) ∧ BelongsTo(z, y) ∧ ¬(x=z))))

3. There is a gym where all members are active.

   Solution: ∃x (Gym(x) ∧ ∀y (Member(y) ∧ BelongsTo(y, x) ⇒ Active(y)))

b. First-Order Logic to English:

1. `∀x (Gym(x) ⇒ ∃y (Member(y) ∧ BelongsTo(y, x) ∧ Active(y)))`

   Solution: Every gym has at least one member who is active.

2. `∃x (Member(x) ∧ Active(x) ∧ ∀y (Gym(y) ∧ BelongsTo(x, y) ⇒ Active(x)))`

   Solution: There exists an active member such that if they belong to any gym, then they are active.

3. `∀x ∀y (Member(x) ∧ Gym(y) ∧ BelongsTo(x, y) ⇒ ∃z (Member(z) ∧ BelongsTo(z, y) ∧ ¬(x=z)))`

   Solution: For every member at a gym, there exists another member at the same gym.